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Article

The Drake Music Project Northern Ireland: Providing Access to Music Technology for Individuals with Unique Abilities

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Abstract

Across the UK, a growing number of charity organisations, social enterprises, academic researchers and individuals have developed music technology-based music workshops and projects utilising Accessible Music Technology to address the issue of access to music-making for people with disabilities. In this article, I discuss my ethnographic study of The Drake Music Project Northern Ireland (DMNI), a charity which provides music workshop opportunities in inclusive ensembles at the community level. My methodology of participant observation involved undergoing the training necessary to become an access music tutor for DMNI, attending workshops and conducting interviews with people throughout the organisation. Key findings were that consumer music technology devices that were not designed to be accessible to a wide spectrum of users could be made accessible through adapting them with other devices or different sensor interfaces more suitable for people with unique abilities and specific needs. Throughout my study I found that it was not in the design of music technology devices that made them accessible. Rather, meaningful music-making emerged through the interrelations between the access music tutors, workshop participants and the music technology interfaces in the workshop environment. The broader implications of DMNI music-making activities and effects on social inclusion are also discussed.

Keywords

accessibility; design; digital; digital musical instruments; disability; music; music technology; social inclusion

Issue

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1. Introduction

Across the UK, a growing number of charity organisations, social enterprises, academic researchers and individuals have developed music technology-based music workshops and accessible devices to address the issue of access to music-making for people with disabilities. Examples of organisations that provide music-making opportunities with music technology exist in the form of community music and disability arts organisations operating at the community level. In this article, I discuss my ethnographic study of The Drake Music Project Northern Ireland (DMNI), a charity which works at the intersection of disability, music-making and music technology. DMNI states that it exists to provide access to independent music-making for children and adults with complex dis-

abilities through the use of Accessible Music Technology (AMT). AMT practices entail matching or adapting a music technology device to a user's specific need.

Another field which has influenced this sphere of musical activity is Digital Musical Instrument (DMI) design and research into new interfaces for musical expression. Academic researchers and independent technologists interested in musical instrument design see the challenges of creating new DMIs as a form of creative expression in itself. In this area of DIY (hobbyist and alternative to consumer) technology making, highly customised adaptations and original designs are often customised and unique to the inventor. This high level of customisation is due to the versatility and variety of easily-available contemporary sensor interfaces that can be incorporated into instrument designs. These low-cost digital compo-

nents have made it possible for makers to use their skills towards creating bespoke Accessible Digital Musical Instruments (ADMIs) customised to the unique requirements of an individual or group of users with disabilities.

In this article I discuss the use of consumer music technology, AMT and ADMIs in DMNI through my research questions: 1) To what extent does the design of devices exclude certain users from engaging with music technology? 2) In what ways can inclusive music-making with music technology contribute to the lives of participants with different abilities?

2. Inclusive Music Education

Musical engagement that is termed as *inclusive* has been defined mostly in the field of inclusive music education research. The global issue of inclusive education is outlined as the rights of a diverse group of children to comprehensive education, including an arts education and cultural experiences (UNESCO, 2005). UNESCO Salamanca Statement, which called for Education for All to educators and parents, governments and the international community, was pivotal for the promotion of inclusive education policy and practice (UNESCO, 1994). Key recommendations included enrolling all children in ordinary schools unless there were compelling reasons for doing otherwise; involving parents and pupils in planning processes; and ensuring teacher training addresses the provision of inclusive education. At present a part of the United Nations Sustainable Development Goals (SDGs) is to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” (SDGs UN, 2015). This is viewed as an important part of contributing to social inclusion in society and towards the universal agenda of the SDGs to wipe out poverty through sustainable development by 2030.

Jellison (2012) argues that access does not necessarily lead to inclusion, in other words, just because music is included in a music program, does not mean it will be inclusive. For meaningful and inclusive music experiences Jellison (2012, p. 67) posits that a meaningful music curriculum should be flexible and accessible, not overly specialised and student progress should be assessed; participation in socially valued roles and activities with “typical” peers should be encouraged; that self-determination is fostered where participants feel safe and secure and are encouraged to experience autonomy and demonstrate competence; and where the design, implementation and evaluation of an individualised music program is discussed with the child and the relevant guardians, carers and professionals significant to the child’s life.

Multiple studies suggest that meaningful inclusive music experiences also depend on positive interactions with others and that these musical experiences need to be enjoyable and rewarding to have a beneficial impact. Furthermore, direct positive interactions require structuring by a teacher to establish an attitude or culture of inclusion in a group (Hallam, 2010; Jellison, 2012; Nordlund, 2006).

3. Music and Disability

In recent years, the academic turn to viewing music as a social process (Clarke, 2005; DeNora, 2000; Small, 1998; Turino, 2008) has opened the way for research into music’s transformative and connective functions within society. Amongst the body of work being conducted in the areas of psychology of music and sociology of music, studies have looked at music as a resource for improving personal wellbeing (DeNora, 2000; MacDonald, Kreutz, & Mitchell, 2013); as a communicative medium in which people can share time and space (DeNora, 2015); and as a transformative practice through which health and disability statuses can be challenged and understood differently (Carlson, 2013; DeNora, 2007; Lubet, 2009; MacDonald et al., 2013; Stewart, Tucker, Williams, & Haaheim, 2017; Straus, 2006). Inclusive music-making has also been researched from the perspectives of social science and critical theory (Bakan, 2009, 2014; DeNora, 2015; Howe, Jensen-Moulton, Lerner, & Straus, 2016; Lubet, 2009; McKay, 2013).

Lubet (2009) argues that difference is not something to be excluded but rather diversity in music education and society overall is important because it strengthens the larger community as a whole. As an ethnomusicologist and music and disability scholar, Lubet draws on the argument that in Western societies musical skill is judged based on accomplishment and virtuosity, and thus those deemed not good enough are excluded from the musician status or even musical opportunities. In comparison to Western cultures, which tend to see music as an art object, produced by specialist artists—John Blacking’s (1974) assertion that the many have been made unmusical so the few can be more musical—ethnomusicology studies have documented a multitude of cultures around the world that view music as a more participatory and social activity. Lubet (2009) asserts that including those who are differently abled or not highly proficient in music theory and performance will give everyone the opportunity to benefit from the experience of music-making and enjoying music as a social activity.

His view of *social confluence* (Lubet, 2011), that a disability/ability is not a fixed status but rather is fluid and in relation to performance of ability converges with DeNora’s (2007, p. 185) view that health and illness statuses take experiential significance from their location in wider systems of meaning, materials and practices. She argues that disability can be reconfigured in relation to practices, materials, beliefs and values. These perspectives imply that the process of disability becoming normalised can manifest through accessibility and creating a “level playing field” for interactions between people with different abilities.

Inclusive music education research has contributed to thought and practice which emphasises children with disabilities and learning difficulties alongside their “typical” peers learning together in environments where self-determination is fostered. These structured teaching

practices aim to lead to positive musical experiences for all participants. Social science perspectives on inclusive music and music and disability uncover the socially constructed aspect to the challenges faced by people with disabilities. The significance of this for people's lives lies in creating a level playing field in society from the perspective that difference and diversity are to be encouraged, included and celebrated; it is through efforts to *normalise* disabilities in society, that a level playing field can be created between people with different abilities.

4. Inclusive Music-Making with Consumer Music Technology, AMT and ADMIs

AMT practices at DMNI entail matching or adapting a musical instrument or sound device to a user's specific need. Utilising computer music technology, AMT practices often involve not only the tools, but also the techniques of the broad genre of electronic music. Thus, delegating musical processes to a computer system is a common solution used to address an individual's barrier to music-making with traditional musical instruments. This means performance processes can be broken down in to parts and redistributed between several performers (as opposed to a solo performer), or a single mode of interaction could control several modes of musical manipulation. This use of music technology is common in electronic music production and performance. It is especially relevant to people with disabilities, who may be able to perform or compose in a way that would not be possible without pre-constructed musical material, or through control of multiple parameters in one mode of interaction (Farrimond, Gillard, Bott, & Lonie, 2011). This is a different mode of musical performance and composition to the techniques associated with traditional musical instruments. In performances with music technology the materials are often music objects themselves, such as pre-constructed audio files (e.g., in the case of DJs, they commonly perform using vinyl records or digital music files), and where computer processes also have agency in music-making and performance (Bowers, 2002; Butler, 2014).

Devices commonly used in this area are AMTs, consumer music technology and DMIs. AMT are devices built with providing access to people with disabilities in mind, they are generally conceived as being universally accessible and utilise simple interaction modes.

These kinds of devices (such as "The Skoog", a cubic squeezable pad interface, or the "Soundbeam", an ultrasonic sensor interface) provide a mode of musical interaction that is accessible for a wide spectrum of people and involve simple movement and hand gestures that most people can participate in. However, as some participants in DMNI workshops expressed, they can also conversely have a negative and stigmatising effect. In certain cases, participants did not want to use a device that differentiates them from other musicians, or use an interface which is very simplified or "toy-like".

Consumer music technology are readily available, simple to use, generic music technology interfaces. These devices are built with an able-bodied target market in mind and are often not accessible to a wide spectrum of users. However, with the assistance of a workshop leader or community musician, these devices can be adapted or used to facilitate music-making in a way that can include people with different types of abilities.

There is also the growing availability of open-source computer and sensor technologies, which are highly customisable to a user's specific requirements, and thus afford great potential for unique and bespoke designs catering to an individual's specific needs (Jewell & Atkin, 2013). Despite these kinds of devices' high level of customisability, they require specialist expertise to build, operate, and maintain. Thus, although open-source technology is increasingly low-cost and accessible, they are not in fact *open* to many users with disabilities or the music community groups they perform with (Samuels, 2015). For settings where speed and directness of connectivity and ease of configuring and mapping is prioritised (for example in a community music workshop), consumer music technology and mainstream devices (e.g., at DMNI one of the most popular being music applications for the "iPad") may be selected over more advanced and bespoke device set-ups. This is because of the time constraints of DMNI weekly workshops, as well as due to community music facilitators lacking the required expertise in DMI design and making.

Much of the academic literature on AMT and music technology in inclusive music-making focus on the accessible devices which provide access to users with different and unique abilities (Andersson & Cappelen, 2014; Anderson & Hearn, 1994; Gehlhaar, Rodrigues, Girão, & Penha, 2014; Matossian & Gehlhaar, 2015; McCloskey, 2014; Oliveros, Miller, Heyen, Siddall, & Hazard, 2011) or to document devices, and experiments in this area (Farrimond et al., 2011; Frid, 2018; Jewell & Atkin, 2013). Some researchers have undertaken ethnographic studies into people's experiences of the use of AMT in inclusive music contexts (McHale, 2015; Samuels, 2016). A distinction can be made here between projects that provide access to music making, typically in projects that involve the creation of ADMIs or AMT, and those which encourage inclusive music-making in settings which bring together people of different abilities aiming to contribute to social inclusion and meaningful music experiences.

5. The Drake Music Project Northern Ireland

DMNI employs trained community musicians (called access music tutors) for inclusive music workshop provision to day centres and community groups across Northern Ireland and to host inclusive ensembles at its three studios in Newry, Belfast and Derry/Londonderry. The workshops can be a mix of people of all abilities, but can also be held in Special Educational Needs and Disability (SEN/D) schools or groups that provide support for peo-

ple who live with the same disabilities or challenges. In addition, DMNI provides one-to-one music tuition through composition workshops. The range of musical ability in DMNI workshops also varies between workshops and group. Some participants have no musical experience and others are proficient instrumental musicians. Others have music technology experience but are not instrumental musicians. Some participants, through attending DMNI workshops over several years, have gained a high level of ability and understanding about the modes of interaction possible with music technology interfaces and can be considered electronic musicians. This illustrates how diverse the activities of DMNI are; the range of workshops provided are not uniform in size, age group, range of abilities, musical experience or community group.

There are six common identifiable stages to the composition process in DMNI workshops, which may happen across one session or several, depending on the group and the project:

1. Icebreaker group activity or discussion;
2. Setting a goal for the session through discussion and consensus;
3. A piece of music, song or soundscape is composed through discussion and musical improvisation. This process entails building up different parts (tracks/recordings) step by step, much like the processes of electronic music production. Consumer music technology and AMT are used with the access music tutor supporting certain musicians that to play music with them;
4. The parts are structured and mixed through discussion and critical listening;
5. The composition may then be arranged for performance with performance interfaces mapped and adapted to perform the music;
6. Once the composition and arrangements for performance are complete, an event may be organised to present the work to a public audience or to participant's family and friends.

This process is led by the access music tutor who is editing and structuring the music on a laptop or computer system synchronously. Decisions are made collaboratively by the group, so the access music tutor also has the role of discussion moderator aiming to elicit the thoughts, impressions and ideas of all group members. This process aims to facilitate independence of choice in each participant, even when that person may not have functional independence in the music making.

DMNI CEO Michelle McCormack expressed what she feels are important qualities in her access music tutors:

Somebody who can actually go in and hold people's attention and in our work as well, somebody who'll go in and take that few minutes longer than they want to take when it comes to the coffee break, to listen to

that person who has very slow speech, and hear just that wee bit they want to tell on how that impacted on them, or take that minute to say "did that actually go the way you wanted it to go?" rather than walking away and thinking god that was great, that switch worked and I'm happy. (Samuels, 2016, p. 31)

She emphasises rather than technical skills, that communication and an attitude of inclusivity are key. This is because they can lead to actions that give people with different abilities in DMNI workshops the space as well as at times the encouragement to be creative, compose, and perform with music technology. As Michelle's interview indicated she was hesitant to place too much emphasis on the role of the affordances of technology in inclusive music making. Throughout my study I found that it was not in the design of music technology devices that made them accessible to use and provide access to music making. Rather, meaningful music-making emerged through the interrelations between the access music tutors, workshop participants (which included people of all abilities) and the music technology interfaces in the workshop environment.

5.1. *Ethnographic Methodology*

Returning to my central research questions, which I investigated throughout my study, I spent over one year conducting ethnographic research at DMNI, beginning with a sixteen-week training course to become one of their access music tutors and moving on to being a part of over fifty community workshops. I established a research methodology of participant observation and semi-structured interviews to understand the ways in which people experienced using music technology in inclusive music-making contexts. In total, I conducted thirty recorded semi-structured interviews, and held many unplanned and informal conversations that I recorded in my field notes with people from all areas of engagement with DMNI.

I have considered the possibility of detrimental consequences for my research-subjects arising from their identification by name and I have discussed this with the individuals involved in my research. Some suggested that I use their real names, or only their first name. I also considered the impact my work may have on DMNI and the participants involved. Thus, I informed research-subjects (and in certain cases their guardian/carer) about the aims and implications of my research and received verbal consent for formal interviews and informal discussions.

I collected the perspectives and experiences on the use of music technology in inclusive music workshops from workshop participants, access music tutors, parents and carers of participants and other DMNI staff through these semi-structured interviews and informal conversations. I also conducted participant observations as an access music tutor whilst engaging in facilitating workshops in the DMNI studios and with community groups

in different settings across Northern Ireland, which included community centres, social care centres for people with disabilities, residential and non-residential SEN/D schools for pupils who require special assistance to attend schooling.

The interview data was thematically coded and my field notes were thematically analysed. In this article I discuss major themes in relation to the research questions: music technology as a facilitator and a barrier, the social effects of music workshops, and issues related to AD-MIs. These are explored through examining the experiences and perspectives of the access music tutor's and workshop participant's perceived challenges and benefits they gained from the music-making at DMNI.

Ethnomusicologists and sociologists of music have long engaged in an understanding of music as a social activity (Blacking, 1974; DeNora, 2000; Small, 1998; Turino, 2008), rather than as reified object. A relational, social understanding of music-making as human activity demands understanding the social relations between individuals, and the creative processes and techniques as they emerge in practice. Furthermore, there are human and non-human agents (technologies) of change through which these processes are enacted.

Electroacoustic composer, improviser and music theorist John Bowers (2002) argues that ethnography is the most appropriate method to understand the dynamic systems comprised of human and non-human agents through which music emerges, in his case, specifically in improvised music using computers and machines; because to understand the organisation of the music, one needs to understand how participants coordinate their activities within such performance ecologies.

Other scholars have employed ethnographic methods in the field of ethnomusicology to investigate the intertwining of processes of performance, composition and improvisation through individual professional electronic musicians in Berlin (Butler, 2014); from the anthropology of music, the localised practices of radio broadcast and the ways in which people imagine and understand radio; the contradictions of artistic legitimacy and authenticity when avant-garde computer music becomes institutionalised (Born, 1995) and from a range of music studies from ethnomusicology to popular music studies to explore the theoretical terrain of "technoculture"; how practices with technology culturally informs and influences aspects of everyday life and musical experience (Lysloff & Gay, 2003).

Gabriella Coleman (2010) in her review of ethnographic approaches to the study of digital culture asserts that trends in new media theory have come under scrutiny by anthropologists for the presumption that digital technologies for holding sweeping visions of a homogenous and global digital age. The fact that digital media and practices surrounding new and emerging forms of communication and media production effect the way people are able to represent themselves and interact is evident, however ethnographic inquiry into a va-

riety of practices with digital technology show the necessity of pushing against narrow presumptions of a universal human experience of the digital medium (Coleman, 2010, p. 487).

One group of people that experience exclusion as part of their experience of the internet and digital technologies are people with disabilities. Faye Ginsburg's (2012, p. 113) study of creative media practices and the inclusive creative engagement an online virtual world such as "Second Life" provides people with disabilities shows that these media forms afford participation in social practices that might not be otherwise available to people who face exclusions from everyday social life. What Ginsburg's work on people with disabilities using Internet-based media show is that the capacities of digital media, rather than standardising media content and homogenising culture, enable significant interventions in our understanding diversity of people's unique abilities.

Goggin and Newell (2007), discuss the paradox of inclusive technology, which is developed with disability as the driver, but because of a lack of processes of critical analysis and evaluation, result in actually producing exclusions for disabled people. Furthermore, they comment that those "who have an interest in the technology, who are the actors, can tell us what we need to know about the strange and contingent ways that technology is created" (Goggin & Newell, 2007), echoing the commitment in the field of Disability Studies to see people with disabilities themselves as the experts on their own lives (Davis, 2000).

I have employed ethnographic methods to understand the perspectives and experiences of the access music tutors and participants involved in DMNI. In addition, I also draw on my own experiences and observations in the field to understand the processes of music making, and the potential affordances and barriers created by specific devices.

6. Music Technology as Facilitator and Barrier

Music technology are the primary tools at DMNI used for music-making with participants who often have unique abilities and do not find traditional musical instruments the most comfortable or effective way to participate in music making. At the same time, many workshop participants and all access music tutors responded in interviews that music technology was often the greatest barrier to facilitating a social activity in the group workshop context. Three main barriers other access music tutors and I encountered repeatedly were: 1) failures of technology, 2) failures in communication, and 3) becoming "stuck behind the screen".

Failures of technology include all technical failures related with the workshop equipment and computer system, e.g., the laptop computer crashing, or issues interfacing music technology devices to the computer system; failures in communication were between access music tutor and participants or the overall group; becoming

“stuck behind the screen”, which was a phrase commonly used amongst access music tutors, denotes the condition of becoming engrossed in editing audio on the laptop computer at the expense of engaging with the people in the room. Each of these problems can cause the breakdown of musical activity in workshops.

Instances of the failure of computer-based music technology (without a computer there is no Digital Audio Workstation [DAW], which is software where all of the music-making is edited, mixed, arranged, and structured in DMNI workshops) highlight the contradictions and contingencies of practice surrounding the very music technology devices that have been previously discussed as affording great accessible potential for people with disabilities. Whilst providing access, they also raise a problem of dependency: when the music technology fails to function can all of the workshop participants still engage in music making? Does the workshop experience shift away from being enjoyable and meaningful for those involved?

Failures in communication between the workshop participants and the access music tutor involve the challenges surrounding listening and engaging the participants in dialogue, aiming to elicit ideas and creative input into the project. Time constraints and equipment failures cut sessions short. Access music tutors also described how their emotions, mental state, and motivations influenced the outcomes of using a piece of music technology.

In the DMNI workshop context the affordances of tools alone cannot have an enabling effect without an access music tutor making efforts in dialogue and structuring the session to include all participants in the music making. From this perspective, any piece of technology (whether digital MIDI controllers, or a DIY solution to adapt an acoustic drum kit) can potentially be used in an accessible way by people of different abilities. It takes discussion and effort arrive at a place where participants can attempt using music technology devices or new forms of adaptations of equipment and thus see if the matching of interface to an individual is an appropriate one. Moreover, through discussion, self-determination in the music-making and roles each participant takes in the workshop is fostered and each person can be included in the creative process. Conversely, access music tutors acting alone without conducting dialogue and consulting others creates a clear barrier to music engagement. Thus, here questions surrounding dependency of the workshop participants on the access music tutor can also be raised.

Access music tutors identified a common phrase they used of being “stuck behind the screen” to describe the main negative tendency in a facilitator’s behaviour in DMNI workshops. Access music tutors described this tension they experienced between facilitating the flow of the workshop and technically managing the music and equipment which was connected to the computer system. In an interview with an access music tutor, Damian,

he emphasised that connection through eye contact with the participants was the most important factor to sustain throughout a workshop. He also commented on trying to get away from “being stuck behind the screen” as much as possible, relating it as a factor that detracted from the overall group musical experience.

During my time as participant-observer access music tutor I accumulated some experience of the barrier between the access music tutor and participants that can be created through interaction with Digital Audio Workstation (DAW software). There are many things to attend to: recognising whether participants are engaged, ensuring music technology devices are functioning, editing audio recordings and facilitating the music-making process. This is especially challenging when the workshop sizes are larger. From the interview responses with workshop participants I found that the level of communication and the perceived flow of the workshop contributed to the participant’s perception of the workshop’s overall success.

7. Music Technology-Based Workshops with Social Effects

During DMNI workshops, when a participant is not able to use the interaction mode of a particular device, the access music tutor will try to work with them to adapt that device in a way that would make it possible for the participant to use it. This could be as simple an improvised and creative solution as fixing a weight to a drum stick to give the participant more power to strike a hand drum with, or it could be using an ultrasonic sensor (“The Soundbeam”) via a converter adapter connected to an iPad to provide a participant who finds the touchscreen interface inaccessible a different means of interacting with the iPad music applications.

One ensemble I was a part of during my field work was called “The Wired Ensemble”, known to its members as “Wired”. It is the longest running ensemble at DMNI. The participants work with the access music tutors through discussion and the breaking down of musical processes into stages, so they can perform through music technology devices, recording layers of compositions into a DAW on a laptop computer.

As Farrimond et al. (2011) highlight, contemporary music technology follows Moog’s (1988) description of a modular system consisting of three main determinants: (1) the sound generator, (2) the interface between user and sound generator, and (3) the visual reality of the overall instrument. Each of these determinants can be modified or replaced, and so for people with unique and specific requirements, each determinant can be customised to meet the need of a particular user. In workshop sessions with “Wired”, the sound generator exists as software installed on the computer accessed through the DAW application. Access music tutors can change the voices of synthesisers quickly with a massive range of sonic possibilities. Although the ensemble has fluctu-

ated in size and membership over the years three core members are Phillip, Tim and Mary Louise. Philip was one of the founding members of Wired when it was formed in 1995:

Yeh, I named it the Wired Ensemble. I wanted it to be called “Wired for Sound” but we decided together Wired Ensemble. The first person I contacted at Drake was Michelle. My music teacher contacted me, and then I contacted Michelle. My music teacher knew that I couldn’t sustain a rhythm, that was all. (Samuels, 2016, p. 91)

The technologies and techniques used with this group are exemplary of the practices with music technology at DMNI. Moreover, being in the ensemble plays a large part in the different ensemble member’s lives. Mary Louise expressed her feelings about DMNI (Samuels, 2016, p. 91):

From an early age I always loved music. I always thought when I was older I would be able to play musical instruments. My family bought me several musical instruments but unfortunately due to my disability I wasn’t able to, so it was the best day of my life at that time when Drake music was brought into my school....I have been with Drake music now for 23 years I can play any musical instruments through technology. I look forward to the Drake workshop every week, we have performed at so many venues over the years it’s so amazing, it’s a big part of my life.

Tim also related to me why the workshops were so important to him via email: “I love Drake because I can compose music with my friends. I can appreciate music more at home now” (Samuels, 2016, p. 91). Tim, Mary Louise and Philip each shared with me in their interviews that DMNI has provided them with a space for an opportunity to compose and express themselves with music. It has also enriched their musical experience outside of the DMNI workshops in different ways. Philip for example produces his own music at home and Tim enjoys listening to music at home. Furthermore, they shared other extra-musical benefits they have gained such as improving confidence, attaining a sense of achievement, an opportunity for forming meaningful social relationships; long-term friendships with other people with different abilities. Both Mary Louise and Tim attend other community arts and community-based activities and have a busy schedule. DMNI activities encouraged them to seek out other creative and artistic activities that they could engage with in the wider community. Thus, the activities at DMNI have a broader positive impact on social inclusion for the participants that extends beyond the workshops, with this impact extending over many years and sometimes decades.

Public performances of musical work also play a part in the activities of DMNI. Workshop series often culmi-

nate in a public performance. The Wired Ensemble members found performance the most enjoyable and rewarding part of their musical experiences at DMNI. Participants who were involved in workshops in community centres, often for a series of eight or twelve sessions, also shared how the workshops had impacted them. Participants shared their excitement and sense of achievement from being involved in the event and collaborating as a group. Participants also all responded positively that they had felt a stronger sense of community and enjoyed collaborating with their peers and friends through music. Throughout the workshops I was a part of, almost all participants responded they had felt a sense of success and achievement through rehearsing and organising their own parts and performing live.

Music Therapy research has identified performance as affording participants the feeling of being able to give back to the community and having one’s talents and creativity valued and praised (Ahessy, 2015, p. 149). Through the process itself, performance promotes cohesion within a group as relationships are created and sustained through musicking with others (Ansell, 2010, p. 168). In addition, performances have been found to promote a sense of achievement and self-worth in the participant (Turry, 2005). Furthermore, Stige, Ansdell and Elefant (2010, pp. 174–176), in a volume exploring music used therapeutically through community-based practices that promote wellbeing and participation (Community Music Therapy), put forward the view that musical performance affords an opportunity for individuals to perform beyond themselves, to break out of the habit of simply being themselves to discover who they are and who they are not, affording the potential for individual transformation. At the same time, social collaboration follows on from musical collaboration (ibid). In this way a group promoting all participant’s ability to participate creates a musical community for everyone involved. Through this, participants gain the opportunity to gain extra-musical, social skills.

8. Bespoke ADMI Designs

As discussed previously in this article, there are a growing number of projects by researchers and music technologists into the area of ADMI design (Anderson & Hearn, 1994; Andersson & Cappelen, 2014; Frid, 2018; Gehlhaar et al., 2014; Matossian & Gehlhaar, 2015; McCloskey, 2014; Oliveros et al., 2011; Samuels, 2015). A DMI or interface is an *open technology*, meaning it can be highly customisable, even bespoke designed, and can be adapted to different sensor input types and modes of interaction (Jewell & Atkin, 2013). The technology used in these kinds of devices are often open source (referring to computer software for which the original source code is made freely available and may be redistributed and modified), so knowledge and designs can be shared freely or built utilising knowledge and equipment anyone can obtain or purchase. For projects which involve

participants with diverse ranges of abilities, these kinds of digital solutions to musical interfaces are flexible and can be designed for a particular group's specific requirements or adapted to suit an individual's unique needs. However, despite these kinds of devices' high level of customisability, they require specialist expertise to build, operate, and maintain.

In March 2015, towards the end of my field work with DMNI, in collaboration with Dr Franziska Schroeder at Queen's University Belfast, Dr Brendan McCloskey, an independent ADMI designer at the time, and Dr Michelle McCormack, CEO at DMNI, I conducted an experiment into "critical making" (Ratto, 2011) through an ADMI design event. Under the theme "Designing Inclusive Interactions", this three-day event connected nine student composers, engineers and interaction designers with five musicians from DMNI, to work collaboratively in teams to design, build and perform improvised music with DIY ADMIs. Matt Ratto (2011) builds upon the possibilities offered by open source software and hardware and explores how "making" can supplement and extend critical reflection on the relations between digital technology and society. He defines his experiments as "critical making": a mode of materially productive engagement that is intended to bridge the gap between physical and conceptual exploration (Ratto, 2011).

His research can be likened to the way in which practices surrounding DMI design, creation and performance challenge traditional musical ontological questions such as: what counts as a musical instrument (or a musician); what constitutes a musical performance; and what is musical communication? Thus, a central concern of the critical design research methodology I employed was to explore whether inclusive practices with DMIs and the development of ADMIs can be said to challenge exclusionary views and preconceptions about people with unique and different abilities.

The event resulted in the creation of five prototype ADMI interfaces co-developed by teams of DMNI workshop musicians and student interaction designers. The devices were built through a participatory and user-centred design process. The event culminated in a public concert of two pieces of improvised electronic ensemble music performed by all of the design event participants.

Interviews were conducted with selected audience members directly after the performance. One question focussed on their feelings about the central role of the DIY ADMIs in the music making. All audience members responded positively in the way that the music-making was perceived as authentic and meaningful. One audience member, whose musical background and preference is classical music and who had no experience of playing or composing with digital technology expressed that the musical expression and musicianship was different to what he was used to but no less engaging or valid in his opinion. He told me that he saw great value in the music that he had witnessed and that the shared atmosphere from the ensemble and the audience was simi-

lar to concerts he had experienced with traditional musical instruments.

I also interviewed a student composer who had attended the performance. The student composes using recordings sequenced in DAW software and so is acclimatised to electronic music production techniques and practices. His impression from the concert were similar to the previous respondent's. His response did not mention the technology however. He focussed on the feeling and atmosphere that the music created for him. When probed to describe more he explained how he had felt that it was not simply the music but he could sense through the project real relationships had been formed in the teams. Other audience members agreed that they had experienced a feeling of collaboration, sense of enjoyment, and that they had felt performers and audience had gained something meaningful from the experience.

All DMNI workshop musicians responded that they had found the experience enjoyable and rewarding. In addition, all participants found the three-day time constraint impacted the initial plans and the actual devices achieved. Many of the DMNI workshop musician's ideas could not be implemented, or due to technical issues, features had to be reduced to finish a device robust enough to be performance-ready. However, interview responses indicated that they found it exciting to perform live and had a sense of achievement and confidence gained from the project.

One participant responded that the bespoke device had provided her access to playing an instrument with keys. This was something she had tried previously but had been told by a piano teacher was impossible for her to do. When she was invited to join the project initially she was hesitant and did not feel she would be able to contribute. After the performance however, she was very encouraged and related that she had gained confidence to work towards further musical engagement and achievements.

Common responses that the nine student interaction designers shared was that the opportunity had expanded their vision of what kinds of projects they could apply their skills and expertise to. All but one of them had never considered accessible design or inclusive music as an application of their expertise before the project. Furthermore, they found the project rewarding and that it allowed them to collaborate and work with people who they usually would not have the opportunity to socialise with. A final point of development the student interaction designers felt they had gained was in communication skills by learning to communicate their expertise and about their area of specialisations with diverse groups of people.

The "Designing Inclusive Interactions" design event created a space where DMNI workshop musicians, students and professionals engaged in a collaborative process resulting in a sharing of experiences garnered from a variety of perspectives. Dialogue between interface designers and DMNI workshop musicians allowed the core

of the accessible devices' design process to be one which was transparent and inclusive of all parties throughout the project, resulting in an improvised musical performance, which was a shared achievement between all participants. The public audience was also introduced to the concepts and importance of accessible design and inclusive music-making and student designers engaged with new potential ways of utilising their specialist knowledge.

9. Conclusion

In this article I have discussed my ethnographic study with DMNI, a charity that provides inclusive music-making workshops through the use of AMT. My central research questions throughout the study were: 1) To what extent does the design of devices exclude certain users from engaging with music technology? 2) In what ways can inclusive music-making with music technology contribute to the lives of participants with different abilities? I explored these questions through my methodology of participant observation and interviews to elicit the perceptions and experiences of the access music tutors who delivered DMNI workshop and of workshop participants, who were often people with disabilities and different ways of working with music technology tools.

A key finding was that consumer music technology devices that were not designed to be accessible to a wide spectrum of users could be made accessible through adapting them with other devices or different sensor interfaces more suitable for people with unique abilities and specific needs. In addition, devices created with the intention of being accessible and universal were often not used, and consumer music technology devices were preferred even in spite of the adaptation solutions required to utilise them. This was because some DMNI workshops participants preferred to use devices which were not viewed as being made for people with disabilities and rather wished to use mainstream devices.

In many instances, music technology actually became the biggest barrier to music making, especially when devices or computer systems failed to operate or required troubleshooting in the workshop session. Furthermore, the music-making and recording of compositions in DMNI workshops are structured through DAW software on a laptop computer. The *pointer* graphical user interface mode of interaction does not best lend itself to creating social interaction with people in the immediate workshop environment as the facilitator's focus is required on the computer screen, rather than being focussed on engaging with the workshop participants. All access music tutors identified this as being the greatest barrier to creating inclusive and meaningful musical experiences.

Towards the end of my study, I employed a methodology of critical making (Ratto, 2011) through curating an event in collaboration with DMNI and Queen's University Belfast in ADMI design. This event saw the creation of five highly-customised and bespoke ADMIs created

through a user-centred and participatory design process. Yet, after the three-day project was completed the devices were never again used. I found that this was because although the designs of the devices were conceived to be highly accessible and provide a high level of usability and independent musical expression for the user, they were built using technology that was inaccessible to DMNI access music tutors, who did not have the specialist knowledge and expertise necessary to utilise and maintain these devices "on the ground" in community workshops. Thus, this finding indicates that the use of music technology at DMNI is accessible not solely due to the features and affordances built into the design of the device itself, but rather in the positive attitudes shared by access music tutors and workshop participants to find creative solutions together in DMNI workshops.

The workshop participants I was able to work with through my study are extraordinary individuals, many with profound challenges in their lives. However, through DMNI workshops they displayed and developed characteristics such as perseverance, resourcefulness, creativity and imagination, and interpersonal skills. In this article I raised a question of whether DMNI workshops create a dependency between workshop participants and the music technology devices they use and between access music tutors and the workshop participants, which is necessary for the workshop participants to engage in music making. Part of the DMNI mission statement is to enable people with disabilities to independently compose and perform their own music, through the use of music technology. How can we understand the levels of independence and dependence involved in music-making in DMNI workshops facilitated by access music tutors and music technology devices?

The music-making takes the form of computer-based music production projects, utilising similar tools and processes to contemporary studio-based musicians and producers. In many situations DMNI workshop participants may not have functional independence in the music making. The facilitation of access music tutors, through dialogue, aims to provide the time and space for individuals with different ways of experiencing music and working with digital tools to input their opinions, preferences and creative ideas. Through this process, the workshop participants foster self-determination both creatively, in artistic and musical choices, and socially in which roles they wish to take in the workshop. Multiple participants responded that they gained confidence from DMNI workshops which translated into their engagement with music and art activities outside of DMNI and also in other areas of their lives. Independence in the DMNI context is not an attribute that an individual either has or does not have, rather it can be seen as something inherently social and relational; when it is enacted it is recognised as a social accomplishment and achievement.

The second research question I address in this article is: 2) In what ways can inclusive music-making with music technology contribute to the lives of participants

with different abilities? I have argued that access to music-making for the participants in DMNI workshops contributed to social inclusion beyond the remit of the workshops. Workshop participants expressed how DMNI has provided them with a space to compose and express themselves through music. This has also enriched their musical experience outside of the DMNI workshops, in certain cases over several decades.

Not all workshops are able to run continuously long-term. This is due to DMNI's reliance on public funding and fundraising, which determines what they can offer to individuals and community groups. Participating in DMNI workshops over many years has encouraged certain participants to seek out other creative and artistic activities in the wider community. Thus, I have argued that the activities at DMNI have a broader positive impact on social inclusion for these participants that extends beyond the workshops, in certain cases with the impact extending over many years.

DMNI workshops, through promoting all participant's ability to participate, become a musical community for everyone involved in which participants have the opportunity to gain extra-musical benefits. Participants expressed some of these as: self-confidence, a sense of achievement, social skills, the opportunity for creating friendships and meaningful social relationships.

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Conflict of Interests

The author declares no conflict of interests.

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